

Integration of Complex Geometry, 3D Woven Preforms via Innovative Stitching Technique, Phase I

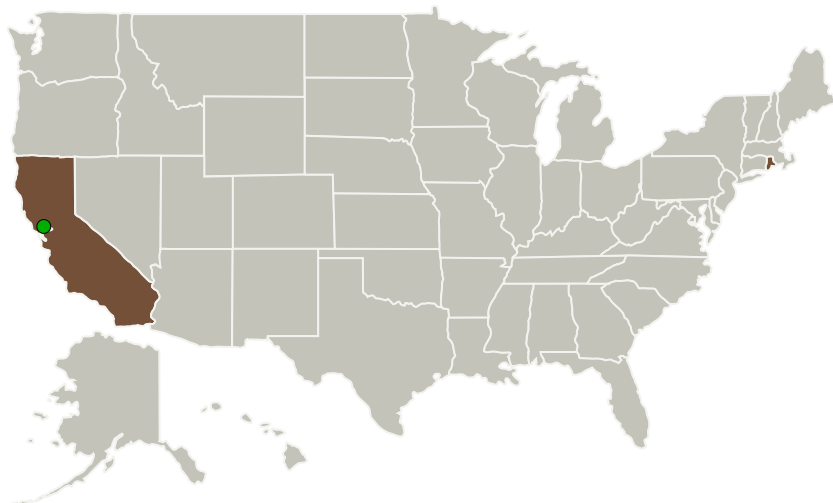
Completed Technology Project (2014 - 2014)



Project Introduction

Thick, 3D woven carbon/phenolic composites offer potential improvement over legacy thermal protection systems (TPS) for re-entry vehicle heat shield applications. However due to the scale and complexity of typical re-entry vehicle structures, it is likely that multiple 3D woven panels would need to be laid up to create the overall heat shield, creating a potential weak spots at the panel joints. T.E.A.M., Inc. proposes to address the joint issue by developing an innovative stitching process capable of forming mechanically reinforced joints between densely woven, 3D carbon fiber pre-forms up to 3" thick. The Phase I scope will include design, model and fabrication of multiple stitched joint specimens, which will be tensile tested to characterize relative strengths of various joint configurations as a function of stitching parameters used. Results will enable calibration of the initial model as well as initial design of a scaled up process capable of producing a full scale, net-shape re-entry vehicle structure within Phase II.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
T.E.A.M., Inc.	Lead Organization	Industry	Woonsocket, Rhode Island
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California



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Primary U.S. Work Locations

California

Rhode Island

Project Transitions

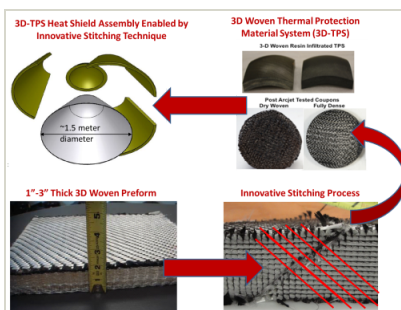
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/141789>)

Images



Briefing Chart

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(<https://techport.nasa.gov/image/131505>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

T.E.A.M., Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

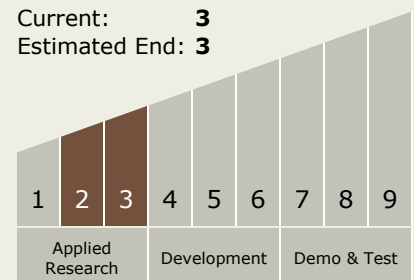
Carlos Torrez

Principal Investigator:

Aaron Tomich

Technology Maturity (TRL)

Start: 2
Current: 3
Estimated End: 3



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Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.3 Thermal Protection Components and Systems
 - └ TX14.3.2 Thermal Protection Systems